

Name(s) of Risk Team Members: J. Scott, Andreas Warkentien, T. Wozniak, K. Riker			Point Value → Parameter ↓		1		2		3		4		5		
Area/Facility Description Title: Collider-Accelerator Department (Refrigerator Turbine Maintenance)			Occupancy or Use		≤once/year		≤once/month		≤once/week		≤once/shift		>once/shift		
Area/Facility # (if applicable): FRA 26-06															
Area/Facility Description: Building 1005R RHIC Refrigerator Room			Severity		First Aid Only		Medical Treatment		Lost Time		Partial Disability		Death or Permanent Disability		
			Likelihood		Extremely Unlikely		Unlikely		Possible		Probable		Multiple		
Approved by: <i>E. Lessard</i> Date: 2-10-2006 Rev.#: 0															
Reason for Revision (if applicable):									Comments:						
					Before Additional Controls							After Additional Controls			
Physical Item or Activity	Hazard(s)	Control(s)	Occupancy A	Severity B	Likelihood C	Risk* AxBxC	Control(s) Added to Reduce Risk				Occupancy A	Severity B	Likelihood C	Risk* AxBxC	% Risk Reduction
Cryogenic fluids and systems	Contact with temperature – extremes that result in such injuries frost bite or burns	Design reviews, ASSRC reviews, Cryogenic safety committee, proof testing, LOTO, work planning, PPE and training, postings, Cryogenic-system designs to consensus codes, inspections, relief valve testing, procedures, work planning	4	2	2	20									
Cryogenic fluids and systems	Oxygen deficiency	ODH analyses, ODH controls, training to ODH 1, interlocked emergency exhaust fans, PPE, remote/local audible/visible alarms, emergency response, EMTs, work planning, POMs, medical clearance, escape pack, MSDS, LOTO, postings, Cryogenic-system designs to consensus codes, inspections, Cryogenic Safety Committee, relief valve testing, procedures, work planning	4	5	2	40									
Pressurized Systems	Being struck by an object due to a pressure release	Postings; PPE; maintenance; training; work planning; Cryogenic Safety Committee /ASSRC reviews; procedures; interlock systems; certification/testing of pressure related equipment; Tier 1 inspections; LOTO; C-AD Chief ME reviews; codes and standards usage	4	3	3	36									
Gases	Oxygen deficiency	ODH analyses, ODH controls, training to ODH 1, interlocked emergency exhaust fans, remote/local audible/visible alarms, emergency response, EMTs, work planning, POMs, medical clearance, escape pack, MSDS, LOTO, postings, Cryogenic system designs to consensus codes, cylinder storage controls, cylinder labels, inspections, procedures, work planning	4	5	2	40									

Hydraulics	Being struck by an object due to a pressure release	Design reviews, ASSRC reviews, proof testing, LOTO, work planning, PPE and training, procedures, spill controls	4	3	3	36					
Cooling water	Being struck by an object due to a pressure release	Design reviews, ASSRC reviews, proof testing, LOTO, work planning, PPE and training, procedures	4	3	3	36					
Confined Spaces	Oxygen deficiency	Training, atmospheric testing before entry and periodically, entry procedures, Permits, work planning, LOTO, respirators, forced ventilation, personnel rescue equipment, emergency planning, EMTs, SBMS, Signs.	2	5	2	20					
Confined Spaces - Metal	Increased chance of shock due to proximity to conducting surfaces	All equipment is listed or reviewed by CEE; work planning; grounding standards; GFCI, LOTO, procedures, training	2	4	2	16					
Electrical equipment & Power Supplies BNL Class A & B <250 V AC, <1000 VDC	Shock or Electrocution	All equipment is listed or reviewed by CEE, Tier 1 inspections, disconnected cable policy, installations comply with applicable codes, procedures, training, distribution drawings, LOTO, energized electrical work permits, ASSRC reviews, qualified electricians and technicians, cabinet interlocks, postings, locked areas, guarding, work planning, GFCI, grounding standards, emergency procedures	4	4	2	32					
Electrical equipment & Power Supplies BNL Class C <600 V AC, <6000 V DC	Shock or electrocution, arc blast, burn	All equipment is listed or reviewed by CEE, Tier 1 inspections, disconnected cable policy, installations comply with applicable codes, procedures, training, distribution drawings, LOTO, energized electrical work permits, NFP 70 E PPE and training, ASSRC reviews, qualified electricians and technicians, cabinet interlocks, postings, locked areas, guarding, work planning, GFCI, grounding standards, emergency procedures, two-person rule for energized electrical work	4	5	2	40					
MCCs, panels and wall sockets	Shock or electrocution, arc blast, burn	All equipment is listed or reviewed by CEE, Tier 1 inspections, disconnected cable policy, installations comply with applicable codes, procedures, training, distribution drawings, LOTO, energized electrical work permits, NFP 70 E PPE and training, ASSRC reviews, qualified electricians and technicians, cabinet interlocks, postings, locked areas, guarding, work planning, GFCI, grounding standards, emergency procedures	4	5	2	40					
Remotely and automatically operated equipment	Being caught or compressed by equipment	Guarding, training, posting, LOTO	2	3	2	12					
Working At Heights	Falls to a lower level such as falling off a ladder or over a railing	Postings, barriers, fall protection, maintenance, training, work planning, procedures, Tier 1 inspections, PPE, approved scaffolding and platforms, approved ladders, anti-slip surfaces	2	5	3	30					
Vacuum	Ear damage	Postings, PPE, maintenance, training, work planning, ASSRC reviews, procedures, Tier 1 inspections, Chief ME reviews, use of industry standards, design reviews	4	3	2	24					

Vacuum	Being struck by an object such as flying debris due to a vacuum failure	Postings, PPE, maintenance, training, work planning, ASSRC reviews, procedures, Tier 1 inspections, Chief ME reviews, use of industry standards, design reviews	4	3	2	24					
Walking – Working Surfaces	Falls at the same level	PPE; Tier 1; work planning; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; lessons learned; regular inspection and maintenance of walking and working surfaces; snow shovels and salt made more available in the winter, heightened awareness	4	4	3	48					
Noise	Hearing Loss	Training, Medical surveillance, PPE, postings, IH monitoring, FRA-6 on general noise issues.	4	4	2	32					
Egress	Impaired egress	Tier 1; work planning; skill of craft; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; internal processes; lessons learned; life safety codes; emergency preparedness, Turbine piping modified to allow acceptable walkway clearance	4	4	2	32					
Storage	Being struck by an object such as a falling tool or materials	Tier 1; inventory control; work planning; postings; labels; barriers; internal and external audits; training; communication; internal procedures; lessons learned, C-AD housekeeping policy.	4	5	2	40					
Chemical Use	Skin exposure	PPE, hazard communication training, specific hazard training, MSDS, SBMS,	3	2	3	18					
Chemical Use	Eye exposure	PPE, hazard communication training, specific hazard training, MSDS, SBMS	3	2	2	12					
Chemical Use	Inhalation	PPE, ventilation, hazard communication training, specific hazard training, MSDS	3	2	2	12					
Hot Surfaces	Contact with temperature – extremes that result in such injuries as burns	Posting, PPE, barriers, training, Tier 1, Labels or posting	4	2	2	16					
Further Description of Controls Added to Reduce Risk:											
*Risk:	0 to 20	21 to 40	41-60				61 to 80			81 or greater	
	Negligible	Acceptable	Moderate				Substantial			Intolerable	